

ELEMENT SUMMARY INFORMATION

Element: 1.3.9 Engineering/Major Repairs and Alterations

Purpose of this Element (Air Carrier's responsibility): To ensure that all major repairs and major alterations are properly accomplished using FAA approved data.

Objective (FAA responsibility): To determine if the Air Carrier follows its policies, procedures, and controls for Engineering/Major Repairs and Alterations.

Inputs:

- Aircraft
- Approved Data Source
- Airworthiness Directives
- Service Bulletins
- Scheduled/Unscheduled Repairs or Alterations
- Structured Repair Manual

Outputs:

- An aircraft that is repaired or altered in accordance with approved data.
- Data related to major repairs or alterations including approved data.

Performance Measures:

- Air carrier submits a report after every major alteration.
- Air carrier maintains a copy of each report of a major repair.
- Air carrier uses (only) approved data for each major repair and major alteration.
- Air carrier has available facilities, equipment, and personnel to perform major alterations and major repairs.
- Air carrier maintains a current list of major alterations for every airframe, engine, propeller, and appliance.
- Air carrier correctly identifies each repair and alteration as major or minor.

SRR:

- 43.13 (a, b) Performance rules: General
- 121.153 (a) (2) Aircraft Requirements: General
- 121.707 (a) Alteration and Repair Reports
- 121.709 (a) Airworthiness Release and Log Book Entry

Other CFRs and/or FAA Guidance:

- FAA Order 8300.10, Volume 2, Chapter 64, Paragraph 3-- "Evaluate Continuous Airworthiness Maintenance Program/ Revision"
- FAA Order 8300.10, Volume 2, Chapter 71, Paragraph 3 -- "Evaluate FAR Part 121 Operator's Maintenance Records"
- CFR 43.3 (f)--A holder of an air carrier operating Certificate may perform Maintenance, Preventative Maintenance and Alterations as provided in Part 121, 127, 129 or 135. (As Certificated)
- CFR 43.7 (d)--A Manufacturer may approve for return to service under certain conditions.
- CFR 43.13 (c)--Special Maintenance Provisions for Certificate Holders.
- CFR 43.17 (e)--Approval requirements
- CFR 21.289 (a)--Landing Gear Aural Warning Device
- CFR 21.289 (b)-- Landing Gear Aural Warning Device may not have manual shutoff
- CFR 121.379 (b)--Major Repairs and Major Alterations must be done I/A/W technical data approved by the Administrator.
- CFR 145.51--Privileges of Certificates.
- CFR 145.79--Records and Reports.
- SFAR36--Development of Major Repair Data.
- CFR 43, Appendix A--Category II Operations Manual, Instruments, Equipment and Maintenance.
- CFR 43, Appendix B--Authorization to exceed Mach I (91.817).

SRR SPECIFIC INFORMATION

SRR	Intent	
43.13 (a)	To ensure that an air carrier performs major	Certification: Airworthiness
	alterations and major repairs using FAA	Surveillance: Airworthiness
	approved means.	
43.13 (b)	To ensure that the air carrier performs major	Certification: Airworthiness
	alterations and major repairs so that the	Surveillance: Airworthiness
	aircraft is returned to its original or altered	
	condition using approved data.	
121.153	To ensure that no air carrier operates an	Certification: Airworthiness
(a) (2)	aircraft unless it is airworthy and meets the	Surveillance: Airworthiness
	approved requirements of FAR121 in that the	
	major repairs and major alterations are	
	accomplished using approved data.	
121.707 (a)	To ensure that the air carrier prepares a report	Certification: Airworthiness
	at the completion of a major alteration or	Surveillance: Airworthiness
	major repair of an airframe, aircraft, propeller,	
	or appliance.	
121.709 (a)	To ensure that prior to operation of aircraft,	Certification: Airworthiness
	after major alteration or major repair, the air	Surveillance: Airworthiness
	carrier prepares, or in the case of outsourcing	
	reports, an airworthiness release.	

1.3.9 Engineering/Major Repairs and Alterations		
SECTION 1 - RESPONSIBILITY ATTRIBUTE		
Objective: To determine if there is a clearly identifiable, qualified, and knowledgeable person who is accountable for the quality of the Engineering/Major Repairs and Alterations process.		
To meet this objective, the inspector will accomplish the following tasks:		
1. Identify the person who is responsible for the quality of the Engineering/Major Repairs and Alterations process.		
2. Review the description in the Manual that delineates the duties and res	sponsibilities of the person.	
3. Evaluate the person's qualifications and work experience (or resume',	if appropriate).	
4. Review the appropriate organizational chart.		
5. Discuss the Engineering/Major Repairs and Alterations process with t	he person.	
To meet this objective, the inspector will determine and record answers to	o the following questions:	
1. Is there a clearly identifiable person who is answerable for the quality of the Engineering/Major Repairs and Alterations process?	☐ YES If yes, provide the name: ☐ NO If no, explain:	
2. Does the person understand the procedures associated with the Engineering/Major Repairs and Alterations process?	YES If no, explain:	
3. Does the person understand the controls associated with the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ No	
4. Does the person understand the interfaces associated with the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ NO	
5. Does the person understand the process measurements associated with the Engineering/Major Repairs and Alterations process?	YES If no, explain:	
6. Is the responsibility of this position clearly documented in the air carrier's Manual(s)?	YES If no, explain:	
7. Are the qualification standards for this position clearly documented?	☐ YES If no, explain: ☐ No	
7a. Are the qualification standards for this position appropriate for the duties that are assigned?	☐ YES If no, explain: ☐ No	
8. Does the person meet the qualification standards?	YES If no, explain:	
9. Does the person acknowledge that he/she has responsibility for the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ No	
10. Does the person know who has authority to establish and modify the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain:	

1.3.9 Engineering/Major Repairs and Alterations		
SECTION 2 – AUTHORITY ATTRIBUTE		
Objective: To determine if there is a clearly identifiable, qualified, and knowledgeable person with the authority to establish and modify the Engineering/Major Repairs and Alterations process.		
To meet this objective, the inspector will accomplish the following tasks:		
1. Identify the person who has the authority to establish or modify the En Alterations process.	ngineering/Major Repairs and	
2. Review the description in the Manual that delineates the duties and re	sponsibilities of the person.	
3. Evaluate the person's qualifications and work experience (or resume',	if appropriate).	
4. Review the appropriate organizational chart.		
5. Discuss the Engineering/Major Repairs and Alterations process with t	he person.	
To meet this objective, the inspector will determine and record answers to	o the following questions:	
1. Is there a clearly identifiable person who has authority to establish and modify the air carrier's policies for the Engineering/Major	YES If yes, provide the name:	
Repairs and Alterations process? 2. Does the person understand the procedures associated with the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ NO ☐ NO	
3. Does the person understand the controls associated with the Engineering/Major Repairs and Alterations process?	YES If no, explain:	
4. Does the person understand the interfaces associated with the Engineering/Major Repairs and Alterations process?	YES If no, explain:	
5. Does the person understand the process measurements associated with the Engineering/Major Repairs and Alterations process?	YES If no, explain:	
6. Is the authority of this position clearly documented in the air carrier's Manual(s)?	YES If no, explain:	
7. Are the qualification standards for this position clearly documented?	YES If no, explain:	
7a. Are the qualification standards for this position appropriate for the duties that are assigned?	YES If no, explain:	
8. Does the person meet the qualification standards?	YES If no, explain: No	
9. Does the person acknowledge that he/she has authority for the Engineering/Major Repairs and Alterations process?	YES If no, explain:	
10. Does the individual know who has the responsibility for the Engineering/Major Repairs and Alterations process?	YES If no, explain:	
11. Are the procedures for delegation of authority clearly documented for the Engineering/Major Repairs and Alterations process?	YES If no, explain:	

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1.3.9 Engineering/Major Repairs and Alterations SECTION 3 – PROCEDURES ATTRIBUTE			
	Objective: To determine if the air carrier has documented procedures for accomplishing the Engineering/Major Repairs and Alterations process.		
To meet	t this objective, the inspector will accomplish the following tasks:		
Alte	iew the documented instructions and information related to the E erations process to ensure that they contain who, what, where, wh	en, and ho	W.
supp	iew the FAA Guidance and Specific Regulatory Requirements (Specific Regulatory Requirements) (Specific Regulatory Regulatory Regulatory Regulatory Requirements) (Specific Regulatory	•	
an u	cuss the Engineering/Major Repairs and Alterations process with inderstanding of the procedures.		
	erve the Engineering/Major Repairs and Alterations process to gazedures.	ain an unde	erstanding of the
To meet	t this objective, the inspector will determine and record answers i	to the follo	wing questions:
	written procedures exist to achieve the desired result of the Enginerations process:	neering/Ma	jor Repairs and
1.1	Do written procedures provide correct definitions of major repairs and major alterations?	☐ YES ☐ NO ☐ N/A	If no or N/A, explain:
1.2	Do written procedures provide instructions for use and limitations of the structural repair manual when it has not been approved (e.g., foreign aircraft, Swearingen aircraft)? [SRR 43.13 (a)]	☐ YES ☐ NO ☐ N/A	If no or N/A, explain:
1.3	Do written procedures require major repairs and major alterations to be classified as RII?	☐ YES ☐ NO ☐ N/A	If no or N/A, explain:
1.4	Do written procedures provide the flight test requirements after completion of major alterations and major repairs? [SRR 43.13 (b)]	☐ YES ☐ NO ☐ N/A	If no or N/A, explain:
1.5	Do written procedures explain methods for acquiring supplemental type certificates, field approvals, or other approvals (e.g., designated airworthiness representatives, designated engineering representatives, designated alteration stations)? [SRR 43.13 (a)]	☐ YES ☐ NO ☐ N/A	If no or N/A, explain:
1.6	Do written procedures provide instructions for maintenance, inspection, and engineering to prepare and create reports/records of approved data used in performance of major repairs and major alterations within 5 calendar days? [SRR 121.707 (a)]	☐ YES ☐ NO ☐ N/A	If no or N/A, explain:

1.3.9 Engineering/Major Repairs and Alterations SECTION 3 – PROCEDURES ATTRIBUTE	
1.7 Do written procedures require that any deviation from the written data must be approved prior to approving the airframe, aircraft engine, aircraft propeller, or appliance for return to service? [SRR 43.13 (a)]	☐ YES If no or N/A, explain: ☐ NO ☐ N/A
1.8 Do written procedures define the method of identifying the reason for the major repair or major alteration (e.g., airworthiness directive compliance, economic)?	YES If no or N/A, explain: NO N/A
1.9 Do written procedures describe instructions prohibiting the use of manufacturer's facsimiles as approved data unless the manufacturer has designated engineering representative authority and has exercised that authority on the facsimiles using FAA form 8110.3? [SRR 43.13 (a)]	☐ YES If no or N/A, explain: ☐ NO ☐ N/A
1.10 Do written procedures provide a list of examples of major repairs and major alterations? [SRR 43.13 (a)]	☐ YES If no or N/A, explain: ☐ NO ☐ N/A
2. Do the procedures identify: who, what, where, when and how?	☐ YES If no, explain: ☐ NO
3. Are the procedures in compliance with the CFR(s)?	☐ YES If no, explain: ☐ NO
4. Do the procedures conform to other written guidance (E.g., Operations Specifications, FAA Orders, Airworthiness Directives, Advisory Circulars, Handbook Bulletins, Directives, and Manufacturer's Recommendations)?	☐ YES If no, explain: ☐ No
5. Does the air carrier have the resources to support the written procedures for the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ NO
6. If alternate procedures exist for use during irregular conditions, do they achieve the same desired results as the primary procedures so that an equivalent level of safety is maintained? (E.g., a manual system used as a result of equipment failure).	☐ YES If no, explain: ☐ NO ☐ N/A, No alternate procedures exist for this element
7. Are the procedures published in different manuals relating to the Engineering/Major Repairs and Alterations process consistent?	☐ YES If no, explain: ☐ No
8. Does the air carrier have a documented method for assessing the impacts of procedural changes to the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ No

1.3.9 Engineering/Major Repairs and Alterations			
SECTION 4 – CONTROL ATTRIBUTE			
Objective: To determine if checks and restraints are designed into the Engineering/Major Repairs and Alterations process to ensure a desired result is achieved.			
To meet this objective, the inspector will accomplish the following tasks:			
1. Review the documented instructions and information related to the Engineering/Major Repairs and Alterations process.			
Review the FAA Guidance and Specific Regulatory Requirements (SRR) included in the supplemental information section of this SAI			
3. Discuss the Engineering/Major Repairs and Alterations process with an understanding of the controls.	appropriate personnel to gain		
4. Observe the Engineering/Major Repairs and Alterations process to g controls.	ain an understanding of the		
To meet this objective, the inspector will determine and record answers	to the following questions:		
1. Are the following checks and restraints built into the Engineering/Major Repairs and Alterations process:			
1.1 Does the air carrier classify major repairs and major alterations as RII?	☐ YES If no or N/A, explain: ☐ NO ☐ N/A		
1.2 Does the air carrier have a method to determine if a repair/alteration is major or minor and identify it as such?	☐ YES If no or N/A, explain: ☐ NO ☐ N/A		
1.3 Does the air carrier flight test major alterations when the alteration could produce a change in aircraft performance?	☐ YES If no or N/A, explain: ☐ NO ☐ N/A		
1.4 Does the air carrier provide a detailed form to report the accomplishment of a major alteration or major repair (e.g., FAA Form 337, engineering authorization form)?	☐ YES If no or N/A, explain: ☐ NO ☐ N/A		
2. Do the checks and restraints ensure the desired result is achieved for the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ NO		
3. Does the air carrier have a documented method for assessing the impacts of any changes made to checks and restraints in the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ NO		
4. Does the air carrier have the resources to support the checks and restraints for the Engineering/Major Repairs and Alterations process?	☐ YES If no, explain: ☐ NO		

1.3.9 Engineering/Major Repairs and Alterations		
SECTION 5 - PROCESS MEASUREMENT ATTRIBUTE		
Objective: To determine if the air carrier measures and assesses the Engineering/Major Repairs and Alterations process, to identify and correct problems or potential problems.		
To meet this objective, the inspector will accomplish the following tasks:		
Review the documented instructions and information related to the E Alterations process.		
2. Discuss the Engineering/Major Repairs and Alterations process with an understanding of the process measures.		
3. Observe the Engineering/Major Repairs and Alterations process to g process measures.	ain an understanding of the	
To meet this objective, the inspector will determine and record answers	to the following questions:	
1. <deleted></deleted>		
2. Does the air carrier's Engineering/Major Repairs and Alterations proprocess measurements?	_	
2.1 The Air Carrier audits Major Repairs and Major Alterations to	o ensure the following:	
2.1.1 Major repairs and major alterations are performed in accordance with the manual.	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
2.1.2 Correct classifications of repairs (major vs. minor) are made.	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
2.1.3 Outsourcing of major repairs and major alterations are performed in compliance with the manual.	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
2.1.4 Records and reports of a major alterations and major repairs are completed.	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
3. Does the air carrier document their process measurement methods and results?	YES If no, explain:	
4. Are the air carrier's process measurement methods effective?	YES If no, explain:	
5. Does the air carrier use their process measurement results to improve their programs?	YES If no, explain:	
6. Are the process measurement results accessible to the FAA?	YES If no, explain:	

1.3.9 Engineering/Major Repairs and Alterations			
SECTION 5 - PROCESS MEASUREMENT ATTRIBUTE			
7.	Does the organization that conducts the process measurement have direct access to the person with responsibility for the Engineering/Major Repairs and Alterations process?	☐ YES ☐ NO	If no, explain:
8.	Does the air carrier have the resources to support the process measurement for the Engineering/Major Repairs and Alterations process?	☐ YES ☐ NO	If no, explain:

1.3.9 Engineering/Major Repairs and Alterations		
SECTION 6 – INTERFACES ATTRIBUTE		
Objective: To determine if the air carrier identifies and manages the interactions between the Engineering/Major Repairs and Alterations process and the other element processes within the air carrier organization.		
To meet this objective, the inspector will accomplish the following tasks.	:	
1. Review the documented instructions and information related to the E Alterations process.	Engineering/Major Repairs and	
2. Discuss the Engineering/Major Repairs and Alterations process with an understanding of the interfaces.	appropriate personnel to gain	
3. Observe the Engineering/Major Repairs and Alterations process to ginterfaces.	gain an understanding of the	
To meet this objective, the inspector will determine and record answers	to the following questions:	
1. Are the following interfaces identified for the Engineering/Major Re	epairs and Alterations process:	
1.1 Aircraft Airworthiness Requirements (Element 1.1.1)	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
1.2 Major Repairs and Alterations (Element 1.2.2)	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
1.3 Maintenance Program (Element 1.3.1)	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
1.4 Inspection Program (Element 1.3.2)	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
1.5 RII (Element 1.3.4)	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
1.6 AD Management (Element 1.3.6)	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
1.7 Outsource Organization (Element 1.3.7)	☐ YES If no or N/A, explain: ☐ NO ☐ N/A	
1.8 Continuous Analysis and Surveillance (CAS) (Element 1.3.11)	YES If no or N/A, explain: NO	

1.3.9 Engineering/Major Repairs and Alterations		
SECTION 6 – INTERFACES ATTRIBUTE		
1.9 SFAR36 (Element 1.3.12)	YES If no or N/A, explain:	
	□ No	
	□ N/A	
1.10 DAS (Element 1.3.13)	YES If no or N/A, explain:	
	□ No	
	□ N/A	
1.11 GMM/Equivalent (Element 1.3.14)	YES If no or N/A, explain:	
	No	
1.12 D.1: 1:1: D. /Fl. (1.2.15)	N/A	
1.12 Reliability Program (Element 1.3.15)	YES If no or N/A, explain:	
	No No	
1.13 Weight and Balance Program (Element 1.3.17)	☐ N/A ☐ YES If no or N/A, explain:	
1.13 Weight and Bulance Trogram (Element 1.3.17)	☐ YES If no or N/A, explain:	
	NO N/A	
1.14 Other programs approved by Operation Specification	YES If no or N/A, explain:	
1.17 Outer programs approved by Operation Specification	No	
	□ N/A	
1.15 Content Consistency Across Manuals (Element 2.1.2)	YES If no or N/A, explain:	
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	□ N/A	
1.16 (Manual) Currency (Element 2.1.1)	☐ YES If no or N/A, explain:	
	□ No	
	□ N/A	
1.17 (Manual) Distribution (Element 2.1.3)	☐ YES If no or N/A, explain:	
	□ No	
	□ N/A	
1.18 (Manual) Availability (Element 2.1.4)	YES If no or N/A, explain:	
	No	
	☐ N/A	
2. List any additional interfaces identified:		
3. Are there written procedures for the use of air carrier personnel in	☐ YES If no, explain:	
the application of these interfaces?	□ No	
4. Are there controls to ensure that interfaces occur?	☐ YES If no, explain:	
	□ No	
5. Are the interfaces between the Engineering/Major Repairs and	☐ YES If no, explain:	
Alterations process and other processes treated consistently in the Manual(s)?	□ No	